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# AIR COMMAND AND STAFF COLLEGE



## STUDENT REPORT

THE OFF UPDATE CYCLE NEEDS YOU!

MAJOR GREGORY S. ZALIEWSKI 88-2830

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REPORT NUMBER 88-2830

TITLE THE OFF UPDATE CYCLE NEEDS YOU!

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Submitted to the faculty in partial fulfillment of
requirements for graduation.

AIR COMMAND AND STAFF COLLEGE
AIR UNIVERSITY
MAXWELL AFB, AL 36112

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

# REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

| | |
|---|---|
| 1a. REPORT SECURITY CLASSIFICATION<br>UNCLASSIFIED | 1b. RESTRICTIVE MARKINGS |
| 2a. SECURITY CLASSIFICATION AUTHORITY | 3. DISTRIBUTION/AVAILABILITY OF REPORT<br>STATEMENT "A"<br>Approved for public release;<br>Distribution is unlimited. |
| 2b. DECLASSIFICATION/DOWNGRADING SCHEDULE | |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S)<br>[illegible]-2830 | 5. MONITORING ORGANIZATION REPORT NUMBER(S) |
| 6a. NAME OF PERFORMING ORGANIZATION<br>ACSC/[illegible]DC<br>6b. OFFICE SYMBOL (If applicable) | 7a. NAME OF MONITORING ORGANIZATION |
| 6c. ADDRESS (City, State, and ZIP Code)<br>Maxwell AFB Al 36112-[illegible]42 | 7b. ADDRESS (City, State, and ZIP Code) |
| 8a. NAME OF FUNDING/SPONSORING ORGANIZATION<br>8b. OFFICE SYMBOL (If applicable) | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER |
| 8c. ADDRESS (City, State, and ZIP Code) | 10. SOURCE OF FUNDING NUMBERS<br>PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO / WORK UNIT ACCESSION NO. |

11. TITLE (Include Security Classification)
THE OFP UPDATE CYCLE NEEDS YOU!

12. PERSONAL AUTHOR(S)
Zaniewski, Gregory S., Major, USAF

| 13a. TYPE OF REPORT | 13b. TIME COVERED FROM ____ TO ____ | 14. DATE OF REPORT (Year, Month, Day) | 15. PAGE COUNT |
|---|---|---|---|
| | | 1988 April | 33 |

16. SUPPLEMENTARY NOTATION

| 17. COSATI CODES | | | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) |
|---|---|---|---|
| FIELD | GROUP | SUB-GROUP | |
| | | | |
| | | | |

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The operational flight program (OFP) update cycle provides tactical aircrews (users) the capability to periodically update embedded avionic computer software. This capability allows the users to improve operational effectiveness in response to a change in operational mission, threat, or modifications to current equipment. Unfortunately, the specifics involved to utilize the cycle are embedded in multi-layered regulations and manuals. This article, written for publication in the Tactical Air Command's Fighter Weapons Review quarterly magazine, intends to inform the reader about the OFP update cycle. The article identifies potential bottlenecks in the system and suggests methods for increasing users participation in the cycle. Potentially, increased user participation may increase the weapon system operational effectiveness and suitability.

| 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT | 21. ABSTRACT SECURITY CLASSIFICATION |
|---|---|
| ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS | UNCLASSIFIED |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL<br>ACSC/[illegible]DC Maxwell AFB Al 36112-[illegible]42 | 22b. TELEPHONE (Include Area Code)<br>([illegible]) 293-2867 |
| | 22c. OFFICE SYMBOL |

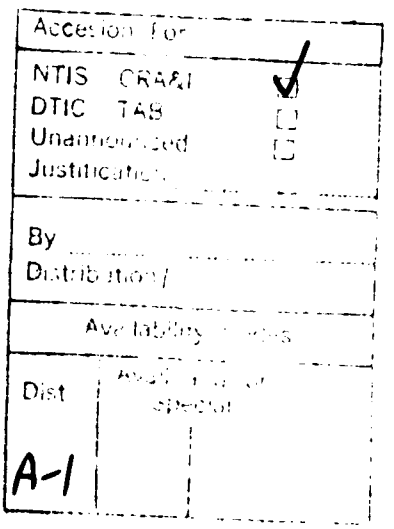
DD Form 1473, JUN 86 *Previous editions are obsolete.*

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

# PREFACE

The operational flight program (OFP) update cycle provides operational aircrews a conduit through which they may suggest changes to software in embedded avionic computers. The change request could be in reaction to change in operational mission requirements, threat, or new and/or modified aircraft equipment. However, due to the complexities involved in the update cycle, and lack of exposure to its capabilities, there is low user participation in the cycle. In an effort to increase user awareness and participation in the cycle, the author prepared this manuscript in fulfillment of ACSC research requirements.

Subject to clearance, this manuscript will be submitted to USAF Fighter Weapons Review quarterly magazine for publication consideration. Therefore, it is submitted in double space format to meet the publisher's requirements.

# ABOUT THE AUTHOR

Major Gregory S. Zaniewski is a senior navigator with almost 2,000 hours of flying time, 1,490 in the RF-4C. He graduated from Texas A&M University in 1973 and was commissioned through Reserve Officer Training Corps that year. After undergraduate navigator training, he was assigned as a sensor operator in AC-130 Gunships and served a Southeast Asia (SEA) tour. Upon return from SEA, he transitioned into the RF-4C and for seven and one-half years, flew in operational squadrons at Shaw AFB, South Carolina and Zweibruecken AB, Federal Republic of Germany. Major Zaniewski served as a RF-4C Instructor Weapon Systems Officer (WSO) for five years and as a Flight Examiner for two and one-half years while in West Germany. From 1982 to 1984, Major Zaniewski served as an action officer on the Headquarters, United States Air Force Europe Operations Staff, in the reconnaissance directorate. Prior to ACSC, he was assigned to the USAF Tactical Air Warfare Center (USAFTAWC). At USAFTAWC, Major Zaniewski worked extensively with embedded avionic computers and their associated operational flight programs. He was the Tactical Air Command RF-4C AN/ARN-101 and AN/AVQ-26 Pave Tack technical focal point and the AN/APQ-172 (RF-4C radar modification) Qualification Operational Test and Evaluation project manager. In addition, Major Zaniewski was the sole tactical reconnaissance WSO involved in the design and acquisition for the F-4 replacement internal navigation system, now known as the Navigation Weapon Delivery System. Major Zaniewski holds a Master's Degree in Management from Troy State University and attended SOS in 1978.

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## REPORT NUMBER 88-2130

## AUTHOR(S) MAJOR GREGORY S. ZANIEWSKI

## TITLE THE OFP UPDATE CYCLE NEEDS YOU!

I. Purpose: To inform mission ready, tactical aircrews about the operational flight program (OFP) update cycle.

II. Problem: As an AN/ARN-101 and AN/AVQ-26 (Pave Tack) technical focal point at USAFTAWC, the author found, TAF wide, a general lack of user awareness of the OFP update cycle. The OFP update cycle is designed to allow users to suggest and recommend changes to software controlling embedded avionic computers, commonly known as OFPs. Changes to software may be generated in a number of ways. A change in the operational mission, equipment, threat, or tactics may require a corresponding change to embedded avionic computer software. The system to effect user's change requirements exists, however; a lack of awareness and involvement prevents cycle employment to its maximum potential.

III. Data: The procedures for changing operational software involve coordination through as many as four major commands. The procedures are "buried" in multiple layers of regulations and manuals. Consequently, the operational aircrew may not be aware of the cycle. This lack of awareness could actually be decreasing the operational effectiveness and suitability of embedded avionic computer software in today's tactical fighter aircraft. The manuscript is targeted towards the operational, mission ready aircrew. Herein, the operational aircrew is shown how he fits into the system and can become an active participant. The article describes avionic computer proliferation within the

TAF. The description provides the reader an appreciation for the nature and breadth of the problem. The author explains a few terms, uncommon to the operational aircrew, for two reasons. First, the terms provide a basic understanding of the cycle so the reader understands the cycle in the terms of the cycle software engineers. Secondly, they serve to educate the reader in hopes that armed with some of the terms unique to the system, he can better communicate with those involved with the system by speaking their language. The article then describes the update cycle in preparation for the aircrew to become involved in the process. Next, the bottlenecks to the system are explained. The reader, by circumventing these bottlenecks, can perhaps expedite his recommendation through the cycle. The article ends with some recommendations and suggestions for improvement.

V. Recommendations: An increase in user awareness and involvement in the operational flight program update cycle can increase operational effectiveness and suitability of avionic computer software in today's tactical fighter aircraft. This manuscript describes the complexities involved in the OFP update process and gives the operational tactical aircrew the knowledge and the motivation to become involved in the process. Therefore, recommend that the manuscript be published in USAF Fighter Weapons Review to provide maximum target audience exposure. Potentially, the result could be a low-cost increase in operational effectiveness and suitability of today's tactical fighter aircraft.

Section One

# THE OFP UPDATE CYCLE NEEDS YOU!

## INTRODUCTION

What have you done for your OFP lately? If your answer resembles something like "What are you talking about?"-- then you are right in line with the findings of a 1985 study commissioned to determine the magnitude of problems associated with the software explosion occurring within advanced avionic subsystems in the Air Force (5:29). In general, the study found that "there were significant opportunities to improve operational readiness by increasing the management attention applied to solving software development and support problems" (5:29). The obvious question now becomes-- Why should I care? Where do I fit in the loop?

As a mission ready operational aircrew, at your fingertips lies the opportunity to improve your operational combat capability, increase mission efficiency, and perhaps save your skin someday. Through the Operational Flight Program (OFP) update cycle you, as a user, have a vote in the improvement of the software which controls your on-board digital avionic subsystems (13:2-3). You don't have to be a computer expert, or possess magical, mystical knowledge of internal computer workings. You only need the desire to improve the operational capability of your equipment so you can do your job better. The

OFP update cycle needs your expertise as a combat aviator-- with the day-to-day experience of employing a weapons system-- to improve the combat effectiveness of your digital avionic computer software-- OFPs.

To introduce the OFP update cycle requires some preliminary information. We'll start with a description emphasizing the problem's magnitude. It's bigger than you think. An explanation of terms unique to the system will help you understand the OFP update cycle. A short word picture of the update cycle will show where you fit in the system. Finally, by looking at some bottlenecks in the system, you'll see how you can provide some valuable assistance to the folks who maintain your OFPs.

Section Two

## AVIONIC SOFTWARE PROLIFERATION

Recent advances in computer technology have resulted in a proliferation of embedded digital avionic computers and software in today's tactical fighters. "In the tactical arena, the advanced computerized fire-control systems and fly-by-wire digital flight controls now employed on the F-16 fighter would have been impossible a few years ago" according to Donald C. Latham, Assistant Secretary of Defense for Command Control Communications and Intelligence (2:65). Current avionic sub-systems such as radar warning receivers, electronic counter-measures pods, navigation and weapons delivery sets, targeting pods and virtually every major digital avionic sub-system introduced recently have a reprogrammable computer controlling their functions (7:21). The Advanced Tactical Fighter (ATF) provides an excellent example of digital avionics technology proliferation.

The ATF is being designed from the "ground up as a totally integrated avionics suite...using the Pave Pillar avionics integration concept" (6:52; 1:S14-S18). According to General Lawrence A. Skantze, retired commander of Air Force Systems Command, ATF engineers "will integrate the functions of communications, navigation and identification through the ICNIA (integrated communications navigation identification avionics)

[sic] program and the functions of electronic warfare through the INEWS (integrated electronic warfare system) [sic] program" (6:52-53). Secretary Latham estimates that "a software architecture embodying an estimated 7,000,000 lines of code will be needed to make the ATF's avionics system work" (2:65). Hand-in-hand with embedded digital avionic computer proliferation is the proliferation of software required to operate these new systems.

In his article "Project Bold Stroke: A Plan to Cap A Software Crisis", Major General Monroe T. Smith, DCS Product Assurance and Acquisition Logistics, HQ, AFSC outlined the major problems concerning the Air Force and the proliferation of software (5:30). First, "every ten years there is an order of magnitude increase in the volume of software on-board Air Force weapon systems" (5:30). Second, the use of "integrated circuits allows more functions to be used... increasing the software required to control those functions" (5:30). Third, the "demand for software will increase by 12% a year for the next two decades" (5:30). Finally, General Smith finds that "70% of the cost of software is associated with the support of the software once turned over to the operational inventory" (5:30). What does this mean to the user?

It means software is here for the duration, controlling now, more than ever, the functions on board your aircraft. Sadly, there hasn't been a corresponding increase in the number of software engineers to support the software proliferation (5:29-30). To help offset the imbalance, the article provides some

observations and recommendations to help control the "crisis."

General Smith recommended a four phase plan to help regain control of the software proliferation. Preliminary steps are underway to provide problem awareness, beginning at the highest management levels (5:29). The second phase involves education and training. Courses at the Air University and Air Force Institute of Technology now include "a segment on software technology and management" (5:29). The other phases involve planning and preparation for software management in the future (5:29).

There you have it. There's a lot of software in the field, more on the way and we lag in keeping pace with the proliferation. But you can help. You, the everyday user can increase the operational effectiveness of your weapon system by becoming involved in the OFP update cycle. You are the systems experts-- you use them everyday. Once you learn a little more about the system that supports your OFP, you can participate in the cycle and see to it that you have the absolute best software available to you everytime you go fly.

## Section Three

### TERMS EXPLAINED

Before an effective dialogue can occur regarding the OFP update cycle, there are some basic terms you should know. (See Table 1.) They are the common language of the software update process and the test and evaluation business. If inspired to become an active participant in the update cycle, your understanding of the terms will be of great benefit.

An operational flight program (OFP) is the computer program required to operate one or more on-board digital avionic computers (8:1). Specific aircraft technical orders contain the information required to operate the system, given a particular OFP. Block cycle changes occur when a number of routine changes are assembled and processed. Collectively, the changes are termed a block (8:3). The supporting Air Logistics Center distributes OFP changes as Time Compliance Technical Order (TCTO) for posting in both the aircrew and maintenance technical orders (7:49).

Operational effectiveness and suitability refer to the usefulness of a given system to the operator and the system maintainer. A system is operationally effective if it provides the operator with the expected response when called upon and no unintended responses result. A system is operationally suitable if maintenance on the system meets specific standards established

| TERM | DEFINITION |
|---|---|
| OFP | Operational Flight Program; computer software. |
| USER | Customer, OFP user. |
| BLOCK CYCLE | Collectively, group of software changes to given OFP. |
| OPERATIONAL EFFECTIVENESS | Measure of system usefulness and efficiency. |
| OPERATIONAL SUITABILITY | Measure of maintainability. |
| OT&E | Operational Test and Evaluation; Process mandated at all DOD levels to determine the operational effectiveness and suitability of new or changed systems. |
| CSSP | Computer Software Screening Panel; working group consisting of managers, engineers and users. Tasks include reviewing and validating candidate changes to OFPs. |
| SCCSB | Software Configuration Control Sub-Board; Board granted authority to approve configuration modifications to OFP. |
| TECHNICAL FOCAL POINT | Individual at either USAFTAWC or USAFTFWC assigned overall management of designated sub-systems. Serves as TAF system expert. Performs liaison between TAC, users, and support agencies. |
| VDD | Version Description Document; Single source document, distributed with each OFP release. Gives current change description and pending changes. Quick source to learn OFP's "health." |

Table 1. Common OFP Cycle Terminology.

for the system (14:68).

Updated software must undergo satisfactory operational test and evaluation (OT&E) prior to its release for operational use (13:7). OT&E policy is explicit in AFR 80-14 which states:

> OT&E is the field test, under realistic conditions, of any item or key component of weapons, equipment, or munition for the purpose of determining the effectiveness and suitability of said for use in combat by typical military users, and the evaluation of the results of such tests. The test environment will be operationally realistic with threats representing hostile forces. Typical users should operate and maintain the systems under conditions simulating combat stress and peacetime conditions (12:21).

Headquarters (HQ) Tactical Air Command (TAC) typically conducts OFP tests at either of two centers established for test purposes (9:1-3). The Tactical Fighter Weapons Center (TFWC) at Nellis AFB, Nevada is responsible for TAC assigned OT&E, although tactics and knowledge of our adversaries is their primary mission (11:1). The USAF Tactical Air Warfare Center (USAFTAWC) at Eglin AFB, Florida is primarily responsible for TAC assigned OT&E (10:1-3).

At both USAFTFWC and USAFTAWC, TAC has established Tactical Air Forces (TAF) Technical Focal Points for various aircraft systems (10:1-3; 11:1). The technical focal point is TAC's working representative for assigned weapons systems. The TAF technical focal point's duties include coordinating all matters concerning a particular sub-system to include software maintenance (10:1-3; 11:1).

The Computer Software Screening Panel (CSSP) is a working level group with several responsibilities in the OFP update cycle

(7:44). At an Air Logistics Center (ALC), it is chaired by either the item manager or the system manager. Its membership includes major command representatives, users, software engineers, and system technical experts. Although the CSSP determines the feasibility of performing software changes, it has no authority to perform software configuration changes (7:44).

The Software Configuration Control Sub-Board (SCCSB) consists of technical personnel, the system manager, and user representatives. The SCCSB has configuration management authority delegated from the system management level or Configuration Control Board. The SCCSB authorizes changes to software programs and their release and distribution. Changes are coordinated at the system level through the SCCSB (7:45).

The supporting ALC prepares a Version Description Document (VDD) for every software block cycle change. The VDD accompanies the OFP release as part of the distribution package. It is important to the aircrew because it describes each OFP change in the block. To you, the VDD serves as a single source document for studying the new or changed OFP capabilities. In addition, the VDD lists the status of impending OFP changes. By checking the VDD you can get an idea of the OFP's "health" and review planned OFP changes (17:--; 16:--).

While this is in no way an all inclusive list of terms used in the OFP update cycle, it's enough for a starting point as we now focus attention on the OFP update cycle.

Section Four

## THE OFP UPDATE CYCLE

Armed with your newfound knowledge of software problems and some of the terminology associated with the update cycle, let's look at the update cycle itself. The cycle is a dynamic and ever changing process that overlaps as new software is being fielded, changed, and tested simultaneously. In order to clarify this description of the update cycle, we'll use an example based upon the author's personal involvement with the cycle as a TAF technical focal point. The example will show how one particular change evolved from an idea to improve the operational effectiveness of the AN/ARN-101 Digital Modular Avionics System, better known among the Phantom drivers as "Arnie", through its actual implementation in the latest Arnie OFP.

AFR 800-14 divides the software support process or update cycle into five functional areas. These areas include request, process, develop, certify, and distribute [see Figure 1] (13:38). Using the ARN-101 example, we'll walk through the process.

The cycle begins when there is a request for change to an OFP. The changes originate from many sources. You, as the users, may require a software change to accommodate a change in operational tactics, mission, or addition of hardware (7:43). A desire to increase system utility accounts for many requested changes. The maintainers may request a procedure change which

could impact the OFP. The supporting agency produces a number of OFP changes that are transparent to the users but increase the efficiency of the operating system. Whatever the source, a change request triggers the cycle into action.

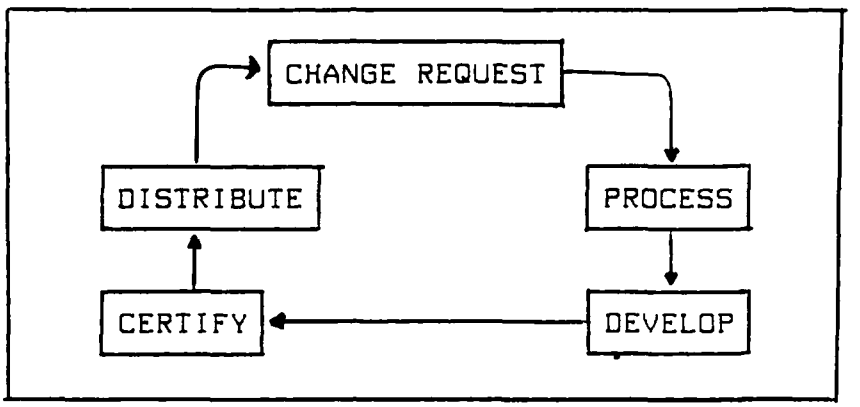


FIGURE 1. THE OFP UPDATE CYCLE.

The cycle's second phase begins as the support agencies process changes. User OFP change requests are normally forwarded to the TAF technical focal point at either USAFTAWC or USAFTFWC. The technical focal point reviews proposals for duplications and validates them for TAF wide applicability. At the TAF system manager's request, the technical focal point compiles, prioritizes, and forwards the change proposals to HQ TAC (8:4).

In the illustrative example, the idea originated from the TAF technical focal point. It involved changing the ARN-101 OFP to facilitate manually changing the current navigation computer destination point. The original procedure required up to six keystrokes to change the destination point and depending on the level of user's experience, significant heads-down time to

accomplish. Being able to accomplish the same task, using a single key to advance or backup the navigation steer point stored in the navigation computer memory would decrease heads-down time and effectively improve the Arnie's operational effectiveness (19:1-2). (Were you paying attention when operational effectiveness was discussed earlier?) The technical focal point forwarded the change proposal to HQ TAC (19:1).

HQ TAC periodically assembles a screening panel to review proposed changes. The users then prioritize changes based on their operational impact. Now blessed by the TAF, HQ TAC forwards the list to the servicing ALC providing OFP support (8:3).

In the example, HQ TAC validated the suggestion to use single keystrokes to advance or backup the navigation point and forwarded it to the supporting ALC (in this case Ogden ALC) for inclusion in the next block cycle.

At the ALC, the CSSP (screening panel) combines the list of recommendations with their own list of changes (normally changes which increase the efficiency of software execution and are virtually transparent to the operator). The recommendations are divided into functional areas; e.g., control and display, weapons employment, sensor management, navigation, etc. A Material Improvement Project (MIP) number and short title are assigned to each recommended change for accounting purposes (7:43). Our example change proposal became MIP 50023 titled "Aided Manual Fly to Sequencing" (17:3).

Within the functional area, software engineers perform change request feasibility studies as the development phase

begins. This study answers the basic questions about the request. Can this change be accomplished via a software change? Will it impact hardware? What resources are required to support this change? Can the change be accomplished organically (in-house) or does it require contractor assistance? (7:44; 15:1).

If the change can be made using organic resources, the engineer prepares an estimate of the resources involved in producing the change to include manhours required to produce the change, amount of memory required, impacts on other OFP functional areas, and associated technical order impacts. The feasibility study provides the information required to authorize effective changes from the list of proposed changes (7:44).

Aided Manual Fly to Sequencing, our example request, is determined to be technically feasible, using organic resources, with a minimum of resources required to effect and implement this change (18:2-4).

The CSSP once again convenes to review the candidate changes (7:44). Based on feasibility studies, the change list is finalized. The new OFP configuration or block cycle change, is now complete. With TAC and user approval, the CSSP closes the block to further changes (7:44). Further changes will be added to the list for the next software block, unless HQ TAC deems necessary to change the candidate list to incorporate a mission essential software modification (7:44).

The software engineers now write software, identify affected documentation, and start bench tests. Software changes are normally produced as "patches" to the existing OFP. Concurrently,

changes to all affected technical orders and documentation are drafted. Using patches and marked-up technical orders, the software engineers perform preliminary bench tests on the Avionics Integration Support Facility (AISF) test bench (7:21).

The changes are now ready for certification. Following satisfactory bench testing, the software undergoes flight test. The operational command must certify through the operational test and evaluation process before it is released (13:7). Upon satisfactory completion of the flight checks, the software is then prepared for the last step in the cycle, distribution.

The SCCSB maintains release authority for OFPs. After flight test report review and with the operational command's concurrence, the new OFP is reproduced and released to the field (7:44). Released in the form of a TCTO, you should see the changes to your flight manuals concurrent with the software installation in your aircraft (7:68). The version description document (VDD) is also released. The OFP update cycle is complete.

Our sample change request, Aided Manual Fly to Sequencing, performed satisfactorily during the RF-4C operational test and evaluation (20:--). The ALC identified and incorporated changes to affected technical orders and aircrew flight manuals. Due to a limitation in the available F-4E computer memory, the CSSP dropped the patch from the F-4E software to accommodate a higher priority change to the weapons list. The patch was retained in the RF-4C software (17:3; 16:1-13).

Sounds easy, doesn't it? Drop a request in the mail and magically your idea is processed, developed, certified, and

delivered to you in the next change to the software. Although it sounds easy, it takes a great deal of coordination and extraordinary management techniques to orchestrate a change to your OFP. As we'll see now, the potential for delays within the cycle is great.

Section Five

## SYSTEM BOTTLENECKS

Any complicated process is vulnerable to breakdown. We have enough experience in the cycle now to be able to predict where the system bottlenecks occur (22:--). To let you know where to expect difficulties in working with the OFP update cycle, we'll look at some of the bottleneck areas. Major bottleneck areas include reporting, evaluating, and testing of the proposed enhancements.

The first obstacle in the update cycle is the reporting system. The official deficiency reporting system may be used per TO 00-35D-54, USAF Material Deficiency Reporting and Investigating System. However, aircrews normally report desired enhancements versus true system deficiencies and therefore, the format and report requirements specified in TO 00-35D-54 can be confusing. AFR 800-14 directs that command and local procedures be established to handle software change requests. If you have a change suggestion, contact the responsible technical focal point at either USAFTAWC or USAFTFWC for the latest guidance. As a minimum, the technical focal point will need the information listed in AFR 800-14, 29 September 1986, page 17, paragraph 8-5b to enter your suggestion into the system.

At no fault to the operators, problem definition also is a continual problem during the evaluation phase. The more

thoroughly and clearly a problem is stated, the greater chance there is in quickly finding a solution. In search of the solution, software engineers often must "wargame" the situation and try to second guess the operator's intention.

Suggesting your own solution may help. Remember, most software engineers do not understand the "heat of battle" aspect of tactical aviation. Buying time is a valid reason for changing the software. Make sure you clearly express and support the reason-- whatever it may be-- for the request in your correspondence.

One important aspect of the OFP update cycle that continually plagues the supporting agencies is requests which involve a hardware versus a pure software modification. The OFP update cycle can only affect requests for software changes where the support ALC uses their organic (in-house) resources to produce the requested change. Knowingly submitting a request which involves a change to hardware only causes bottlenecks in the system and needlessly delays the update cycle. Hardware changes follow a different route. If in doubt, consult your technical focal point for assistance.

Sometimes the solution to a software change request may generate a corresponding hardware change. In these cases, the supporting ALC has a conduit to filter the request. The problem with hardware changes is funding--the software folks do not have access to the type of funds required to support pure hardware changes.

Once an OFP enters the testing phase, the potential for delays is compounded by factors unique to the test and evaluation

process. Test bed aircraft are a limited resource, with high demands, competing for scarce instrumented range facilities. Test criteria demand absolute control over the test item and test variables. However, the rigorous test process is necessary to ensure the maximum operational effectiveness and suitability for the test item. Software is no exception. Don't be discouraged if your change is "hung up" in the testing process. Take heart. You've made it through the major portion of the cycle. Following successful flight test, the only remaining steps in the cycle are approval and distribution!

Change prioritization can be a potential bottleneck to the system. Often users fluctuate the emphasis (i.e. change their mind) on change priorities during various working group meetings. An urgent or emergency change request can also preempt a routine OFP block cycle change. Because the cycle is a dynamic and ever changing process, there can be more than one cycle in various stages of completion simultaneously. If the priorities change in one cycle, the domino effect can seriously impact subsequent software blocks. At the user level, there is little control over the priorities assigned different change suggestions. The bottom line is to provide solid justification for your submitted change request so that once it enters the cycle, it stays in line with the other changes and does not get "bumped."

## Section Six

## SUGGESTIONS AND RECOMMENDATIONS

The OFP update cycle provides a way for operational aircrews to improve the operation of their weapon systems software. But, the system is not without its problems and shortcomings. How can we as users improve the cycle and make it more responsive to the needs of the users?

User education is a good place to start. By being more aware of the cycle, what it involves, and how it works, you can participate in its execution. Perhaps you've never heard of the cycle before. A little advertisement of the cycle and its capabilities is bound to help.

Currently, there is no user education or awareness provided for the system users at the very basic levels. A short block at the schoolhouse level could expose everyone to the existence of the OFP update cycle. Later, when more experience with the system is obtained, you'd at least have an idea of how to upgrade your OFP, if the need arises.

Technical focal points may be of some assistance to increase user awareness of the OFP update cycle. Since TAC has assigned them the responsibility for OFP management, users should take advantage of their expertise when considering OFP changes or enhancements.

Unit weapons and tactics officers may already have or can establish OFP working groups or steering committees to manage OFP changes. OFPs could be added to the agenda's of major TAF conferences such as tactics reviews and Major Command Manual 3-1 rewrite conferences. Any forum where aircrews assemble to discuss weapons system management is an excellent opportunity to discuss and prioritize candidate OFP changes.

Increased unit interface between the user organization and the software support agency would increase the efficiency of the process (22:--). Besides the unit becoming acquainted with the software engineers responsible for OFP maintenance, the engineers would benefit by learning firsthand why certain changes are requested. Remember the discussion concerning the "heat of battle" aspect of tactical aviation? Communicating heat of battle as justification for an OFP enhancement or change is difficult to accomplish clearly on paper. Face-to-face discussions with the operators could help the engineers understand some change requests.

A word of warning to those so inspired to submit an OFP change via the OFP update cycle: the wheels of progress turn very slowly. It could be as long as three years before you see a change to the OFP reflecting a particular change request (4:29). Some of the delay is by design. TAC specifies a 12 month OFP update cycle as a goal (8:3). This is to keep the operators from being flooded with a new OFP before the ink is dry on the latest change. The support agency will do all they can to get the changes incorporated into the OFP as quickly as possible.

Section Seven

## CONCLUSION

This OFP overview intended to make you, the system user, more familiar with the process used to maintain your software's operational effectiveness and suitability. The proliferation of avionic computer systems in current and plans for future aircraft have spurned a mammoth increase in software supporting embedded avionic computer systems (2:69-77). Mission ready aircrews must be familiar with the processes used by the support agencies to optimize weapon systems operational effectiveness and suitability. But, the system is complex and traverses major commands, increasing the confusion in the OFP update cycle. Therefore, the incentive to use the cycle is low.

Having been on both sides of the fence, as a mission ready crewmember and as a technical focal point, the author encourages your participation in the OFP update cycle. While it's true the system is complex and has limitations and bottlenecks, it could benefit from your expertise and participation. In the end, you'll be better prepared to face your adversary.

The system works. That was driven home while viewing Pave Tack imagery on the national news following the Libyan raid. After countless meetings concerning software controlling Pave Tack functions and data displays, there was a great sense of pride and accomplishment in knowing that somehow the OFP update

process contributed to Pave Tack's combat readiness and ultimately, to the raid's successful result.

Lieutenant General John D. Foss, USA, in his address "Leadership American Style" emphasizes the importance of combat readiness. General Foss says one thing we learned "again" from our experiences in Grenada was "...you go to war the way you are today-- not the way you want to be" (21:--). Is your OFP ready to go to war today? Or is there something you could do to make it the way you want it to be? Think it over and remember-- the OFP update cycle needs YOU!

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